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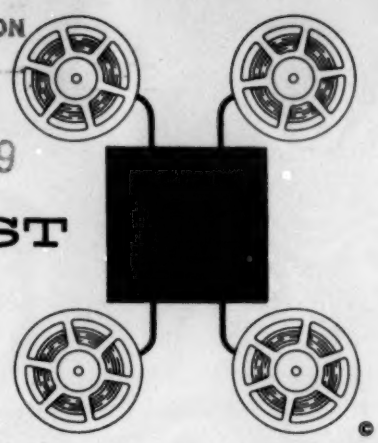

# DATA PROCESSING DIGEST

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## Programing

### AUTOMATIC PROGRAMMING—WHAT DOES IT OFFER, HOW DOES IT WORK?

*OFFICE MANAGEMENT, August 1959; pages 19-21; 72-74; September 1959; pages 24, 25.*

Automatic programing is "a system by which a computer can be given business instructions for an entire business operation in comparatively simple English sentences. The computer then translates these instructions into complete and detailed operating instructions in machine language by calling on a library of stored sub-routines for each simple English operating verb entered on its input units. The operating instructions, combined with descriptions of the data to be processed, are combined into a master tape which serves as a complete program for the desired operation."

Remington Rand was the first in the automatic programing field with its Flow-Matic ((see DPD, August 1959, page 15)) designed by Dr. Grace Murray Hopper, Head of Automatic Programming Research, Remington Rand Univac Division. The approach was "to classify all program input information going into the computer into two categories: verbs, action words, which would trigger ready-made sub-routines, and nouns, descriptive words which could be assigned the particular meanings the company using the machine wished. The verbs would have the same meaning in any application; the nouns, describing the business data to be acted upon, could vary with each particular company." The Division developed a "pseudo-code" of simple English words, which, when written in simple sentences, could create an entire computer routine, without the need for trained programers to work out each step the computer needed to take to go through the routine.

"Under the Flow-Matic system, the entire pseudo-coded instructions are . . . processed through a 'compiling' routine which creates a complete program in machine language on the data processor itself. The taped program produced is then fed into the processor with the data to be processed to update the particular records concerned or solve the stipulated problem."

The nouns, identified by the company using the system, would include descriptions of an existing file or set of reels of tapes; items, records, or sets of words; or "fields" or sets of characters.

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*Two new developments*

Two recent developments in automatic programing are 1) the creation of a Committee on Data Systems Languages under the auspices of the Department of Defense ((see page 11)), and 2) IBM's Commercial Translator. "Since the Department of Defense emphasis is on as much speed as possible in achieving a common language for computer input, it seems certain that the first such language achieved will represent a fusion of the vocabulary of Flow-Matic, and the vocabulary of Commercial Translator."

Commercial Translator uses 16 operating commands, compared with the present Flow-Matic thirty. Each of the 16 commands represents a general operation. When combined with a small group of connective words and nouns, and signs for the basic arithmetic operations, they will, IBM believes, cover the entire range of business data processing.

*Commercial Translator is a test of procedure statements*

Commercial Translator instructions are set up as a series of procedure statements, most of which set up a condition, and then say what is to be done if the condition proves true or untrue. That is, the logical structure of the programs consists of a series of tests, following the structure, "IF... THEN... ELSE..."

"By phrasing as many of its procedure statements in this form as possible, IBM can cut down the translation time within its processing routine, since the frame of the statement need not be translated word for word by the machine; it can be recognized as a statement of a particular logical form. Only the alternative operations to be followed, and the words establishing the condition to be tested need to be translated. Thus, to a degree each statement is translated in word groups rather than as individual words.

"Like Rem Rand's Flow-Matic, Commercial Translator permits the user to use his own terminology for data descriptions, as long as the words chosen do not duplicate words already embodied in the Commercial Translator language."

"Conditions may also be based on tests of equality or other relations, and six such relations have been embodied as phrases in Commercial Translator: EQUAL or IS EQUAL TO; IS GREATER THAN; IS LESS THAN; IS NOT LESS THAN." All can be translated by the computer as complete units, rather than word for word.

*Computer creates its own efficient program*

Another feature of the Commercial Translator is a scanning procedure by which the processor itself creates the most efficient program possible, in terms of machine steps. "After all directions have been translated in the processor, the processor tape controlling the machine directs it to identify and group all similar operations. The machine then reviews the directed operations, now translated into its own internal operating language, to eliminate repetitions, and make whatever consolidations of operations are possible. After each group of related operations has been reduced as far as possible, all directions are then meshed again in the assembly phase to create the final program."

# General Information

## NABAC CONVENTION NOTES

*(NABAC, The Association for Bank Audit, Control and Operation)*

Several news releases concerning addresses before the NABAC Convention in September are of interest to the banking industry. Edward T. Shipley of Wachovia Bank & Trust Co., Winston-Salem, N. C., discussed the ways in which an auditor can look at a computer: 1) he can insist that all audit procedures and audit trails formerly maintained be retained; 2) he can attempt to include in the programs an audit trail which will permit tracing any transaction through the entire process; 3) he may view the computer as an audit tool and develop programs which will force the computer to produce data he needs. Mr. Shipley foresees the "sophisticated" approach to be the design of programs specifically for the audit function, in which the machine may be forced to scan the recorded data and call to the attention of the auditor any exceptions.

*Check printing industry finds MICR imposes new standards*

The check-printing industry was represented by G. W. McSweeney of DeLuxe Check Printers, Inc. He revealed that the MICR specifications have imposed printing standards and tolerances never before encountered by the printing industry. Of the 12 conditions originally imposed, seven are under control. These include format, spacing, skew, alignment, character dimension, embossment and signal level. Remaining conditions still puzzling the printing industry are: uniformity of ink, character edge irregularity, voids, extraneous ink on the back and extraneous ink on the front.

The type of account numbering, and the quality of check imprinting may be the key to an economically feasible magnetic ink character recognition installation, said Forde U. Steele, Central National Bank of Cleveland, Ohio. These two requirements have seven important aspects: 1) the customer's role; 2) choosing the numbering system; 3) the problem of readability of magnetic characters; 4) who will pay for the imprinting; 5) getting customers to use the imprinted checks and deposit tickets; 6) the problem of uncontrolled items; 7) handling non-coded items.

*Numbering systems should be designed for easy sorting*

Mr. Steele believes a numbering system should be designed first of all for facility in sorting. "There is considerable evidence that no bank, regardless of size, accomplishes very much by adopting the alphanumeric system... if it wants to provide for compatibility between semi-automatic and fully automatic equipment and to make ample provision for expansion of the system." Most banks are not large enough to justify a fully automated check account system. "This means that full automation can be made available to thousands of banks on an economical basis only through the use of a service bureau of jointly owned equipment." He observed that "this country will be better off if city banks do not provide electronic check processing for their correspondents. Competitive pressures being what they are, it would not be long before rate cutting and even free check processing would become the principal sales tool in the correspondent bank field."

Regarding customer acceptance of the new system, Mr. Steele believes the development of a metal or plastic plate for use with an imprinter might help solve the problem.

*Centers for small bank "on-line" installations*

A discussion of the advantages and disadvantages of "on line" and "off line" computer installations for savings banks was presented by Everett J. Livesey, The Dime Savings Bank of Brooklyn. He stated that forty tellers, entering savings deposit transactions at the same instant, can all complete their transactions in 60 seconds, with the use of "on line" equipment. In this system the window machines are an integral part of the computer installation and the customer's account is updated while he is at the window. In the "off line" system, the window operation is recorded on punched paper tape, or punched cards are made of the transaction, and are used later as input to the computer. In the matter of signature verification in an "on line" system, Mr. Livesey reported that Teleregister Corporation has developed an idea of reproducing in each passbook a "scrambled" signature which can be read only through a special apparatus at the teller's window. The scrambling would vary from bank to bank so that one bank's apparatus will not "unscramble" another bank's signatures.

On line systems for small banks could be feasible through the use of computer service centers. The first three on-line systems will be in operation next summer. They will be the Howard Savings Institution in Newark, N. J., Union Dime Savings Bank in New York City, and The Society for Savings in Hartford.

Regarding the use of computer service centers, Mr. Livesey said small banks in a 100 mile radius could use a central computer, that "confidential information" was not a realistic objection because the only information fed to the computers would be account numbers and balances, not depositors' names, and that mortgage information was already a matter of public record. As an example of such cooperation, he mentioned the Middletown, Connecticut Savings Bank and the Middlesex Mutual Assurance Company, who are planning a joint computer center.

## ELECTRONICS IN BANKING

*Pamphlet published by The Institute of Bankers, 1959.*

The field of banking in Great Britain is making progress in electronics in a manner somewhat similar to banking in the United States. However, some differences in tradition from U. S. methods are threatening to hamper rapid progress. One of these traditions is the custom of providing statements in "narrative" form; that is, describing the transaction in terms of, for example, the name of the person receiving a check, or the type of dividend.

Magnetic ink character recognition is part of the cooperative program of British banks. The type style being considered is more like normal type faces than the A. B. A. type style, but will be the same height, and will be placed in a similar position on the check.

Another problem facing British banks is the mechanical sorting of checks, which are lighter in weight than U. S. checks. The British do not wish to sacrifice their check quality, which they believe to be far more tamper-proof than checks of any other country. However, retaining the present weight paper will make it necessary to do much experimentation in check-handling devices.

Many other aspects of Bank automation in Great Britain are covered. To order a copy of the pamphlet, write to: The Institute of Bankers, 10 Lombard Street, London EC3, England.

## ELECTRONIC AIDS TO BANKING

*JOURNAL OF INSTITUTION OF ELECTRICAL ENGINEERS, March 1959, pages 139-144.*

Bank automation is proceeding more slowly in England than in the United States, but is following similar lines. In this article it is suggested that banks separate their customer service and management operations in branches from the accounting functions, and combine all accounting activity in one central location which would employ a computer system for the accounting procedures. This would make electronic equipment more of an economic possibility than at present. Communication links between the branches, and between each branch and the center would be selected according to their cost. It has been found that closed circuit television, while effective, is too costly. It is suggested that the existing Post Office telegraph network be used during its slack period.

## THE BANKS PLAN FOR THE FUTURE

*R. Hindle, Martins Bank Ltd.*
*AUTOMATIC DATA PROCESSING, August-September 1959; pages 41-45, 50.*

A general description of progress in banking electronics in England is presented, progress which follows the U. S. system rather closely. One of the difficulties in promoting banking electronics is the comparative unpopularity of checking accounts among working people. Crediting an employee's account with his paycheck by his employer may increase banking activity in the immediate future.

## SOME CASE-HISTORIES OF BUSINESS COMPUTERS IN THE U.S.A.

*JOURNAL OF INSTITUTION OF ELECTRICAL ENGINEERS, June 1959; pages 347-352.*

Four case histories of U. S. companies who have installed computers with success are discussed: Bank of America, American Airlines, Certified Grocers of California, and Collins Radio Company. The case histories represent four entirely different applications and complements of equipment. The purpose of the article is "to show

how computers have been introduced into some large American businesses, with special reference to the planning before installation and to how the problems during this period were solved. A secondary aim is to give some results of the use of computers as business machines."

In the concluding paragraphs are these statements: "There is a feeling that one encounters that not a few British installations have been 'ill-conceived,' so that the results are disappointing. In America, business methods are treated more thoroughly than in this country; in fact, the Americans take a more professional view of the subject.... Office automation is proceeding more rapidly in the U. S. A. than in Britain. Our slowness is probably due to conservatism in, and lack of incentive for, management."

## BRITISH COMPUTER SOCIETY CONFERENCE AT CAMBRIDGE

*THE ACCOUNTANT, August 29, 1959; pages 135-138.*

The first conference of the British Computer Society was held in Cambridge June 22-25. A brief review is given of the papers presented. These included a review of developments in British computers, selecting and training programers, auditing problems, automatic programing, magnetic tape experience, production control and other commercial applications, using a computer in management control, and logical design. In general computer progress in England appears to be following that in the United States.

## CLIENTS HIRE COMPUTING TIME AT A "SELF-SERVICE" CENTRE

*AUTOMATIC DATA PROCESSING, July 1959; pages 50-52.*

Ferranti Ltd. has established a computing center in London on an "open shop" basis. Clients are encouraged to help themselves, to do their own programing and prepare their own input tapes. Eighty percent of the work performed at the center is prepared in this way. The center charges 50 pounds ((about $140)) an hour for machine time. Ferranti also offers a complete service.

## WHERE NEXT? SOME CONJECTURES ON THE FUTURE OF THE LARGE-SCALE COMPUTER IN INTEGRATED COMMERCIAL WORK

*COMPUTER JOURNAL, July 1959; pages 85, 86.*

An improvement over the haphazard methods of devising systems for computers in the recent past is the current method of considering the problem as a total concept from the start, then to take slices of the concept and develop them one by one into working jobs.

Two factors may make a computer installation more costly than necessary: 1) because of the "sliced" development of the scheme, there will be an immense amount of work devoted to transferring information from one run to another; 2) because of the "one thing at a time" approach of a computer, considerable computing time will be wasted within each run as various units wait for each other, and during the change over from one run to the next.

Answers to these problems lie in current computer developments. 1) The difficulty of transferring information from one run to another can be met by very large random-access storage. The difficulty here is in the large amount of access time necessary. 2) By using random-access memories, the jobs may be run in parallel rather than successively, cutting down the computer waiting tim

## MANAGEMENT ACTION AND PLANNING FOR SUCCESSFUL EDP INSTALLATION

*Dr. Michael Shegda, Lybrand, Ross Bros. & Montgomery*
*JOURNAL OF MACHINE ACCOUNTING, September 1959; pages 12-20.*

Major problems in planning for EDP are found in the five areas of management responsibility, staffing, surveying present procedures, system design, and equipment. Prior to authorizing a costly EDP study, management should be fairly sure that the company's data processing requirements do not preclude the use of a computer. Management should understand the characteristics of EDP, and assume responsibility for many of the decisions in acquiring the system. The EDP study should be made by qualified personnel spending their full time on the project. They should have a broad background in systems work and an understanding of applied mathematics. Valuable assistance may be obtained from having a consultant on the staff. The groups should be responsible only to top management. At least one person should be appointed from each department to work with the EDP group.

*How the EDP committee begins*

The group will gather the following types of data for their survey:

1. Nature and volume of transactions, records, and reports.
2. Cost data.
3. Samples of all forms, records, and reports.
4. Special data processing and management problems.

In developing the systems plans, the group should consider the consolidation of source records, centralization and integration of data processing functions, exception reporting, and operations research. Department representatives should participate in cost studies by furnishing estimates of clerical cost reductions and evaluating intangible benefits.

*What the manufacturers need to know*

In asking manufacturers for proposals, the EDP group should ask to have included:

1. Process chart of the computer and auxiliary machine operations.
2. Processing time for each type of equipment recommended.
3. Proposed method of storing and arranging each master file.
4. Rental charges, purchase prices, and maintenance.
5. Production status of each piece of equipment--whether operating or being developed.
6. Delivery and installation dates.
7. Educational and programing assistance.
8. Equipment installation requirements and costs.
9. Requirements and costs of supplies, such as magnetic tapes.

Manufacturers should be allowed at least two months to submit proposals. Evaluation of proposals is a difficult task. It should include checking to see that all required data were submitted; verifying timing of machine operations; analyzing arrangement of file data.

After the EDP group makes a tentative equipment decision, they should prepare a cost analysis for management. One-time costs, such as system design, physical installation, and conversion, should be allocated over a span of time equal to the expected usefulness of the equipment. The report should include a summary of benefits, tangible and intangible.

After selection of equipment, the remaining tasks should take at least eighteen months, and include:

1. Recruitment and training of detailed planning personnel.
2. Completion of the systems plans.
3. Designing and ordering forms.
4. Timing and scheduling equipment operations.
5. Preparation of procedures manual.
6. Conversion planning.
7. Defining details of computer program, in a computer flow chart.

8. Coding.

9. Preparation of site.

10. Ordering supplies.

## INSTALLATION OF A 305 RAMAC AT CARTER CARBURETOR DIV.

*Robert M. Anderson, Carter Carburetor Div., ACF Industries, Inc.*
*SYSTEMS & PROCEDURES, May 1959; pages 23-29.*

A detailed description is given of the preliminary studies and the installation phases of the Carter Carburetor Division's IBM RAMAC. Some of the "traps" which the EDP committee fell into in the early study phase are given. "Hours saved are not necessarily people, machines, or dollars. Savings in personnel do not always materialize, at least proportionately. It is also difficult to maintain the proper perspective when dealing with fractions of people....If you have a small EAM installation, hours 'saved' may allow you to take on more work but seldom will they allow you to release a machine....There are the additional problems of peak work loads, scheduling, deadlines, and the risk of overloading one machine with no reserve capacity. You may even mistakenly consider as hours saved those that were part of a second shift or of overtime....If you have a large installation...there is the added risk of considering total hours saved as being in one lump sum whereas they are an accumulation of numerous short intervals spread over several machines and over an entire month. Be wary also of an estimated total personnel and machine hours saved multiplied by an hourly cost and of showing this as 'savings.'"

## FORCES THAT FEED AUTOMATION

*Ralph C. Graves, Ralph C. Graves Associates, Ltd.*
*BEST'S LIFE NEWS, September 1959; pages 50-56.*

The mere installation of an electronic data processing system does not necessarily mean economies in a life insurance operation. For example, the determination of some companies to write all original policies by means of a computer raises some doubts about economical results. If an agent is able to write a policy in his own office by hand in twenty minutes and collect his premium on the spot, there is little savings to anyone if the company insists on preparing the policy some miles away on its computer, no matter how rapidly. In other words, the attendant labor and transportation time and costs would overshadow the computer's accomplishment.

As another example, forms which include space for data on all possible situations will be unnecessarily involved, and take more time for processing than if exceptional items were segregated on the same, or other forms. Similarly, if a high speed system of processing data

in the central office resulted in a situation which delayed the collection function of the agent, where is the saving? In other words, the entire system must be studied before the efficient use of electronic equipment can be planned.

## ELECTRONIC DATA PROCESSING—PROGRAMMING FOR THE INTERNAL AUDITOR

*Virgil Blank, Haskins and Sells*
*THE INTERNAL AUDITOR, September 1959; pages 16-26.*

The internal auditor has the important task of establishing and maintaining certain controls in an EDP system. As in any system, he must establish controls in the manual phases, including the accuracy of input data. Mechanical controls are built into electronic equipment by the manufacturer. The auditor should be familiar with program controls (many of which are library routines supplied by the manufacturer) and logic controls, which are "related to the methods selected within the electronic system for verification of portions of the routine not readily subject to outside checking." The internal auditor is also concerned with output controls in the production of documents and reports.

*Auditor should help with systems design*

For the development of an audit trail, the internal auditor should participate in the systems design at which time he can make valuable suggestions for controls. From the system design, the internal auditor should compile an analysis of the system for use as reference material, designed to fulfill the needs of the audit staff on a continuing basis. Because of the size and complexity of computer applications, they are generally divided into segments called "runs." Each run analysis prepared by the internal auditor should contain the following:

1. A list of inputs with a short description of their natures and designation of the source of the input data.

2. A list of outputs with a short description of the natures and a designation of the next use of these data.

3. A complete description of the processing which takes place during the run. This should recite all features of the processing and list all exceptions considered in the process, and should include a description of the various tape records.

4. Logic charts and tape record layouts.

5. External controls directly related to the run data.

6. Copies of manual control forms.

7. Internal controls of the system. This should include descriptions of mechanical, program, and logic controls and the action taken upon activation of a control check.

8. Formulas for control balancing.

9. Comments of auditor regarding effectiveness of controls.

10. Copy of all output documents.

"The auditor should then summarize the comments in the analysis regarding controls. This summary, together with copies of output documents, should be used to devise an audit program. If this study results in a need for some by-product of the various runs, such as more detailed print-out or edited data for confirmation of balances, the auditor should discuss this with the analysts. The auditor will probably conclude that there is an excellent audit trail in this new processing method. Some of this trail may disappear momentarily into the equipment, but the mechanical audit taking place therein is probably more thorough than any auditor would perform."

## THE COMPUTER CHALLENGE

*E. D. Dwyer, Chief, Navy Management Office*
*NAVY MANAGEMENT REVIEW, August 1959; pages 2-8.*

This article is based on an address before the Life Office Management Association Conference, in April 1959. It was digested in DPD, June 1959, page 1. If you have been unable to obtain a copy of the address from the author, you may write to the Superintendent of Documents, Washington 25, D. C. for a copy of this issue of the Navy Management Review. Enclose 15¢.

## A COMPARISON OF AN ERROR-CORRECTING EIGHT-UNIT CODE WITH OTHER TELEPRINTER CODES FOR BINARY TRANSMISSION AND TERNARY RECEPTION

This paper, by M. D. Lum, Wright Air Development Center, describes an eight-unit double parity check code which was shown to be the best of seven "marks and spaces" codes by which teleprinter information is sent electrically. The paper may be ordered from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Ask for PB 151659. $1.25

## COMMON LANGUAGE FOR DATA PROCESSING SYSTEMS

The Intermediate-Range Task Force of the Department of Defense's Committee on Data Systems Languages is asking persons engaged in all aspects of business data processing applications to consider becoming associate members. The IRTF has the task of specifying a common language for describing data processing systems,

and hopes associate members may give them the benefit of their experience. Associate members will not be asked to participate extensively in the work of the Task Force, but will receive the publications of the Task Force, and will be called upon occasionally to respond to surveys or give opinions on certain subjects.

Persons interested may write to Mr. A. E. Smith, Chairman, Intermediate-Range Task Force, Code 280, Navy Department, Bureau of Ships, Washington 25, D. C. Give a statement of interest and experience.

# Applications

## THE FIRST NATIONAL BANK OF BOSTON HAS NOVEL COMPUTER OPERATION

*UNITED STATES INVESTOR, September 5, 1959; pages 9, 10.*

The First National Bank of Boston has devised a unique coding technique for 900,000 stockholder accounts for corporations for which it acts as Transfer Agent. Each time a stock is bought or sold, the bank's computer examines the record for each certificate involved and automatically creates a "Name Code" for the transaction by extracting key information from the account title. The computer system, using this newly created code, then examines the bank's master files to locate the record needed, and effects the changes.

*Computer codes stockholders names*

"Name Code" is defined as a set of rules under which the computer automatically selects 16 alphabetic characters from the stockholder's name, or the legal title in which the stock is registered. These characters are thereafter used by the computer for sorting, filing, and posting operations in place of an ordinary account number. The basic word in the title, under which the item is to be filed, is keyed so that the computer may recognize it. This is done by having the typist, when she prepares a new stock certificate or a record with respect to its transfer, place one or two colons in the proper location in the title. The lower dot of the colon has been removed from the type bar, so that only the top dot appears in the typed document. The document is then visually examined to check its proper coding. The typist follows two simple rules in placing the colon: 1) She must place one colon in the space which would otherwise appear immediately before the word in the title under which the account is to be filed; 2) if a fiduciary is named, a second colon must precede the given (first) name of the first beneficiary mentioned; if no beneficiary is mentioned, then the second colon must precede the surname of the principal. Under a carefully defined set of rules, the computer then proceeds to extract from the colonated words, and from other words in the title, the key of 16 alphabetical characters, chosen as a strict function of the number of words in the title.

*For similar names, check further*

Similarity of names occurred in about 3% of a sampling of 23,400 accounts. Providing for this redundancy was done in different ways for debit and credit transactions. In a debit transaction, the computer is instructed (when it finds an account with a key similar to the transaction) to look for the number of the certificate being surrendered, and if it finds it and the number of shares agree, and it has not been previously recorded as surrendered, to post the surrender date and adjust the ledger balances accordingly. This reduced the redundancy factor to 1-1/2%, the credit transactions.

In the credit transactions, certificates issued are involved. The computer is instructed to check the file to see if one or more accounts have the same key as that developed from the title on the new certificate and, if such redundancy exists, to examine each word in the title of the certificate and compare it with that on the file; if a similarity still exists, to check the street address of the stockholder, word for word. If these comparisons are not satisfied, a new account is opened and the certificate posted to it. The only mistake the computer can make is to open a second account for a stockholder when he should have but one such account. To guard against this possibility, however, the computer whenever it opens a new account on the file, and there is one or more accounts already on the file with identical keys, reports the new account so opened and the details with respect to the other account, or accounts with the same key. The Bank's experience to date indicates that there are only three or four such items to be examined each day.

"Name Code" is a practical solution of the problem of maintaining large files in alphabetical order where the volume of daily transactions is relatively small. The calculation of them is relatively slow, and could become a significant factor in an active file.

Portions of the above digest were taken from a pamphlet titled "Name Code--A Unique Method of Filing Accounts Alphabetically on a Computer," by B. W. Taunton, Assistant Comptroller, The First National Bank of Boston, Boston, Mass. A copy of the pamphlet may be requested from Mr. Taunton.

## AEROQUIP SOLVES THE MULTI-PLANT INVENTORY CONTROL PROBLEM

*Burleigh Cook, Aeroquip Corporation, Jackson, Michigan*
*PURCHASING, September 14, 1959; pages 87-89.*

Aeroquip Corporation uses an IBM RAMAC 305 to maintain the stock records for all four divisions. Formerly, only the sales and production control people at the division receiving an order would know about the order. Ideally, however, "if this order should require a special production run or long manufacturing lead time, someone should know all the possible alternatives: ship specific components that are "out of stock" at Jackson from another division; ship completed assemblies from another division; add the required quantity to a production run that is currently in process at another division."

*Computer makes shipping decisions*

In the Aeroquip Corporation, the computer determines if the order can be shipped from the division receiving the order. If not, it informs the material control planner of the existing alternatives. By reviewing the status of the inventories of items active during the day, the computer can decide which items need reordering and automatically produces a four-part punched card reorder package consisting of the following:

1. Reorder notice which indicates current balances on hand and on order, reorder point, average usage, standard cost, cost category, and date of last transaction. If another division also stocks the part, the available balance and average usage of this part at that division will be shown.

2. On-order record which shows vendor code, and other pertinent order information.

3. Requirements record, which is a tabulation of all open orders for the part due to be shipped in each of the next four months. Also shown is the available balance and average usage for two other divisions in which the part may be stocked.

4. Usage record which provides the material control planner with a basis for analyzing overall usage patterns which may indicate a seasonal demand, consistent upward or downward trends, etc.

Although the use of economic order quantity and safety stock determinants gives some control and direction to inventory management, changes in demand and product obsolescence can throw inventory out of balance. At Aeroquip, inventory analysis by almost any classification can be called for through the production of inventory reports by the computer system. The management of Aeroquip believes that "the job of inventory management is one of becoming aware of the exceptional condition at the right time without a constant manual review of all items. When the inventory manager is presented with the means for isolating the 'out of pattern' situations, he usually can do something about them."

## PURCHASING MECHANIZATION: WHAT HAPPENS WHEN IT TAKES OVER?

*PURCHASING, July 6, 1959; pages 76, 77.*

Westinghouse's air arm division in Baltimore is mechanizing its purchasing function, using eight-channel punched tape and edge-punched card equipment to originate 27 pieces of information used as the basic data for many departments. Most of this information comes from the engineering drawing and its bill of materials, operational line-ups, and standard time values. Using the data origination techniques of IDP, the company is processing information to departments

in parallel lines rather than in series, to speed the information flow. In the Purchasing function, the data will be used to keep a historical file of parts and vendors, develop vendor performance ratings, prepare ratings for buyers, set up a "tickler" file, and create management reports.

The tab department will use punched cards produced by the system to update open commitment records, relieve commitments when shipments are received, and aid cost control on contract and budget expenditures. Receiving will use the edge-punch cards for producing receiving documents, and inspection papers, notifying receipts to requisitioners, and providing documents for stores information. The cards will also be used for inventory control and planning and scheduling departments.

## COMPUTER IN THE GAS FIELD

*Francis A. Langenfeld, Northern Natural Gas Co., Omaha, Neb.*
*PS: PAPERWORK SIMPLIFICATION, Third Issue, 1959; pages 18, 19.*

Meter charts are placed on a calculating instrument to translate the line reading into a numerical reading. These readings are punched into cards. Then the cards are used for updating magnetic tape files, and for computer processing of a wide variety of customer, production, and management reports. The meter activity is automatically printed on the back of the meter chart for a permanent record.

Information siphoned off the original recording from the meter chart is used for delivery statements, for royalty payment information and royalty checks, for marketing reports, and for state regulatory reports.

## RECORDS FOR TELEPHONE BOOK DELIVERY ON RCA 501

The records on delivery of the Manhattan classified directory will be processed on the RCA 501. The computer will update customer delivery files daily, and make delivery order changes even after the books begin coming off the press. The computer procedure will apportion directories to the proper delivery truck and turn out printed orders for the R. H. Donnelly Corp., distributor of the directories in Manhattan. In so doing, the computer will take into account the varying weights of the different directories and limit individual bundles accordingly. Order slips will tell the delivery man what directories to take to specific business establishments or homes. ((From a news release.))

# Systems Design

## SYSTEMS AND PROCEDURES RESPONSIBILITY

*Philip H. Thurston, Harvard University*
*Published by Graduate School of Business Administration, Harvard University, 1959. $2.50.*

The case study method is used to determine the most effective responsibility for systems and procedures activity in a business organization. Six large manufacturing companies were visited, ranging in size from 25,000 to over 175,000 employees. Thirty-two projects in the six companies were researched. The researcher found four general approaches to systems work, and relates the consequences of each.

These four approaches were: 1) Systems planned and installed by specialists; 2) Systems planned and installed by operating people; 3) Systems planned by specialists and installed by operating people; and 4) Shared responsibility for planning and installation. The researcher concluded that the fourth method was the most effective, and points out four characteristics of good systems work: 1) the systems work of specialists and operating people complement each other; 2) a trial installation is of great importance in development of a new system; 3) continuing responsibility is important in the planning and installation phases of a project; and 4) leadership responsibility in systems projects should rest with operating people.

## A CODE FOR BIRTH DATE AND SEX

*Mario Banfi, Management Consultant, Staten Island, N.Y.*
*THE OFFICE, September 1959; pages 141-145, 266.*

A method for manually and mentally computing a ((presumably unique)) code for date of birth and sex is given. This code may be tabulated for clerical reference, but is so simple, it may be computed mentally on the spot. The method is called the Times Forty Plus (x 40+), and is derived in the following manner:

1. The month of the birth date is converted to its numerical equivalent (1 through 12).
2. The numerical month value is multiplied by 40.
3. To this product is added the day of birth.
4. Add 500 to this total for females, or males, whichever group is larger in the file.
5. If the resultant total is 1000 or more, drop the first digit.

Some short cuts may be made to simplify the procedure. Multiply the month by four. Add the first digit of the day (if a two-digit figure), then attach the second digit of the day as a suffix. Then adjust for male or female. Example: December 28, female 12 x 4 = 48; 48 plus 2 = 50; add suffix 8 = 508; adjust for female (add 500 if file is set up this way) = 1008; drop the one = 008, which is the code number.

((This is an example of the way in which data file sizes can be reduced if relationships implicit in the data are understood and utilized.))

# Machine Linguistics

## A COMPUTER ROUTINE FOR LOGICAL RECALL

*Elementary learning routine for information selection*

The National Bureau of Standards has developed a computer routine called IQ, along with a machine model, that simulates certain logical "remembering" operations. The routine was designed to illustrate some of the potentialities that high-speed electronic data processing machines may have for automatic information retrieval, literature searching, or routing, classifying, and indexing of printed matter.

The program consists of an initial vocabulary of terms that can be recorded in the machine's memory, together with clues to some of the logical and semantic relations between the terms. The program also includes routines for various operations upon the machine's store of "knowledge" as available at any one time.

For example, suppose that the machine is given an initial vocabulary consisting of the names of all the United States presidents, together with information about each man. Once the machine has this initial set of facts and a set of routines to carry out several operational commands, it is prepared to carry out a variety of recall operations as specified by the machine operator. If he asks the machine to "define" the term "Lincoln," the print-out will contain all the other terms associated with Lincoln.

More complicated types of command are: Match, Reject, and Select. In addition, the machine program accepts from the operator or other input means a hitherto unknown term occurring together with familiar terms which share one or more associations. The routine can provisionally assign to the new term the cross-references which the accompanying terms have in common, thus displaying a very limited degree of machine "learning." The machine handles these new facts on a trial-and-error basis, informing the operator of its tries as the program proceeds. The operator can tell the machine whether the tries

are correct or not; the machine will "remember" only the "correct" relationships.

By applying what is known about learning and recall operations to determining ways in which machines may be used to speed information selection and retrieval, it may become possible to free the documentalist or literature searcher for those tasks to which his creative, self-conscious, and critical intellect must be applied.

For more information, write to National Bureau of Standards, Office of Technical Information, Washington 25, D. C.

# Equipment

## ELIMINATING COMPUTER INCOMPATIBILITY

*ISA JOURNAL, September 1959; page 85.*

The University of California Radiation Laboratory at Livermore, California, had the problem of making several pieces of electronic equipment work together. The installation has a Univac I with its high-speed printer, and several IBM 704's without an IBM high-speed printer. A listing of the characteristics of each system shows seven discrepancies:

| | IBM 704 | UNIVAC I |
|---|---|---|
| Recording tape | Plastic 1/2", 2500 ft. per reel | Metal 1/2", 1500 ft. per reel |
| Pulse density | 200/in. | 128/in. |
| Recording method | non-return to zero | Return to zero |
| Reading head | 7-channels, in line | 8-channels, 2 staggered rows |
| Sprocket signal | none | signal for each digit in tape |
| End-of-recording check signal | Longitudinal check signal generated on tape at 3-4 pulse times after end of record | none |
| Computer code | binary decimal | Excess 3 binary decimal |

*Univac printer can print from IBM tape*

The solution was as follows: The Univac printer was made compatible with the higher impulse-density and shorter between-block space of the IBM 704. This was done by reducing the speed of a Uniservo. When information was written on the tape, since the writing speed remained the same, the pulse density was increased.

Next, a reading head compatible with IBM recording was mounted on the Uniservo. Also, reading amplifiers which would convert IBM non-return-to-zero recording to Univac return-to-zero recording were installed. Then the IBM 704 binary decimal code was converted to the Univac excess-3 code by means of a subroutine to the IBM computer.

The lack of a sprocket signal on IBM tapes was remedied by buffing the outputs of all 7-channel amplifiers together and triggering a delay flop, which provided the pulse used as the sprocket signal. To keep the printer from reading the longitudinal check digit on the IBM tapes, which would be read in as the 121st digit, the timing of the read-ending pulse was changed to apply the jam-clear signal 100 microseconds, rather than the normal 400 microseconds, after the 120th digit was read from the tape.

Finally, a reel hub was designed which would secure an IBM 10-inch plastic tape-reel as well as the Univac metal tape-reel. The switch-over from Univac to IBM operation of the printer is achieved by a single switch mounted on the printer's control panel.

## VISUAL DATA INSTANTANEOUSLY

*DATA PROCESSING, July-September 1959; pages 142-147.*

The Deccafax is a facsimile transmitting system that works on the theory of a closed-circuit television circuit, without the expense of a television camera. The system consists of a transmitter connected by cable with a receiver, up to 2000 yards distant. Greater distances may be accommodated by the use of amplifiers. Twelve miles is the greatest distance the system has transmitted, at the present time.

*TV transmission of information without TV camera*

The receiver is the simpler of the two units. It is a console with a special 14-inch cathode-ray tube that gives an almost flicker-free picture (405-line to conform with standard British television practice). Controls are provided for controlling the brightness and height of the picture.

The transmitter is similar to the receiver, with the addition of a hood, in the top of which is fitted a photo-multiplier tube. Light from the screen of the cathode-ray tube is reflected by a mirror into the photomultiplier fitted in the hood. Dependent upon the picture projected, the luminosity of the light spot will vary as it traces out the lines of the scanning pattern and the electrical signal produced by the photo-multiplier will vary in sympathy. After amplification, this elec-

trical signal is sent to a receiver where it alters the intensity of the scanning spot projected on the cathode-ray tube, so that any picture placed in front of the screen of the transmitter will be reproduced immediately on the screen of the receiver. This is the relatively simple device which replaces the television camera.

Preparation of a picture for transmission is extremely simple. Material must be on a transparency not exceeding 10 by 8 inches. A clear glass cover is fitted in front of the cathode-ray tube for protection. The transparency is laid on top of this glass. The glass may also be used as a slate, and messages or diagrams may be inscribed on it with a Chinagraph pencil.

Visual data can be sent from one transmitter and reproduced on the screen of a second transmitter, which in turn may be re-transmitted. Corrections or additions to transmitted copy may be made on the image with the Chinagraph pencil. The composite image is then transmitted. A television camera may be connected to the system, and conventional television receivers can be modified to act as receivers. Two-way sound equipment also may be tied in with the system. Deccafax systems are presently being used by a leading firm of British stock brokers, and by the British Railways.

## NEW MACHINE READS TYPEWRITTEN PAGES FOR PROCESSING DATA

*OFFICE EQUIPMENT & METHODS, September 1959; page 50.*

The Print Reader MX-2021 has been developed by Intelligent Machines Research (Farrington Co.) for the Air Force. It reads ordinary typewritten sheets, both upper and lower case, numerals, and punctuation symbols. The Print Reader scans the typewritten characters, and produces video impulses which it then analyzes for various identification clues, making a sophisticated analysis in identifying the pattern. The output can be punched paper tape, punched cards, magnetic tape or direct input into electronic computers.

The Print Reader's ability to discover patterns in printed material will be used for translating, indexing, abstracting, and retrieving information without the necessity of a human operator entering original data by keyboard.

CORRECTION

The price of "Programming Business Computers" reviewed on page 11 in the October, 1959 issue of Data Processing Digest was erroneously given as $3.50. It should be $10.25.

## Comment

## GETTING ON THE AIR

Are you about to decide to "go" EDP? Have you been sweating out the decision of whether to use a computer or not? You haven't begun to sweat! For, if you do go EDP, the period which will find you in the sweat box will be the installation period--that little-discussed period (only four articles digested in DPD in two years) when you must realize the promises you made in the EDP feasibility study. The experience of others indicates you should watch these problem areas:[1]

*Three problems to avoid in the installation phase*

1. Orient your personnel. Nothing will scuttle an EDP program like the non-cooperation of the personnel who must help pin down the system details, who must feed data to the system, or must use the results. One public utility EDP system floundered because branch office personnel felt their responsibilities were reduced by EDP. A straight-forward program to communicate the place of EDP in your company should start during the feasibility study and continue until the system is accepted as a normal part of the firm's operations.[2]

2. Get good programing help. In terms of man-years, and problems, big and small, the process of programing will cause the most trouble during installation. To reduce problems to a minimum and to come somewhere near meeting installation schedules do these things:

*Expert programing personnel*

a. Obtain, by hiring or by consultation, at least one expert programer. He must have three or more years experience in business data processing programing. This may seem expensive at first, but it will pay off well in problems you won't have to face. (If you depend on the equipment supplier for this help, be sure the people he is providing are really experts.)

b. Write your programs in problem-oriented-languages such as Flow-Matic, AIMACO, or Commercial Translator.[3] This will make it easier to train the programing staff, will permit management to understand the programs, and will make inevitable revisions comparatively easy.

c. Don't underestimate the time to check out the programs and integrate the programing system.

3. Plan your physical site with care.[4, 5] Don't let a "Pentagon" fire put you out of operation.[6] Or perhaps worse, don't let poor layout make your day-to-day operations awkward and therefore prone to error.

Plan ahead. Don't be "penny wise." And you will "get on the air" on time with an EDP program that pays off the way you said it would.

REFERENCES

1. Canning, R. G. "Installing Electronic Data Processing Systems," Wiley, 1957.

2. "How Seven Companies Prepared Their Employees for Automation," AMERICAN BUSINESS, October 1958, page 28 (DPD Dec. 1958, page 4).

3. "Significant Advances in Automatic Programing," Comment, DPD, August 1959, page 15.

4. "Nine Ways to Avoid a Headache," MANAGEMENT AND BUSINESS AUTOMATION, January 1959, page 34 (DPD March 1959, page 5).

5. "Cutting the Cost of Your EDP Installation," Report published by Canning, Sisson and Assoc., 1958.

6. A Government report on the fire in the Air Force Computer Center in the Pentagon Building is obtainable from the General Services Administration, Washington 25, D. C.

# Training

The Application of EDP Techniques to Production and Inventory Control, Orientation Seminar No. 114-94, presented by American Management Association

Date: November 11-13, 1959
Place: New York City (Hotel Astor)
Fee: $175 ($150 for AMA members)
Information: American Management Association, 1515 Broadway, New York 36, New York

Operations Research Two-Week Course, sponsored by Case Institute of Technology

Date: January 18-29, 1960
Place: Case Institute of Technology, Cleveland, Ohio
Fee: $400
Information: W. W. Abendroth, Program Director, Operations Research Group, Case Institute of Technology, 10900 Euclid Avenue, Cleveland 6, Ohio

Engineering and Management Course

Date: January 25--February 4, 1969
Place: University of California, Los Angeles
Fee: $400
Information: College of Engineering, University of California, Los Angeles 24, California

# Meetings

Operations Research Society of America National Meeting
Date: November 11-13, 1959
Place: Pasadena, California (Huntington Sheraton Hotel)
Information: ORSA, Mt. Royal and Guilford Aves., Baltimore 2, Maryland

Eastern Joint Computer Conference
Date: December 1-3, 1959
Place: Boston, Massachusetts (Statler Hilton Hotel)

Sixth National Symposium of Reliability and Quality Control
Date: January 11-13, 1960
Place: Statler Hilton Hotel, Washington, D. C.

66th Annual American Mathematical Society Meeting
Date: January 27-29, 1960
Place: Conrad-Hilton Hotel, Chicago, Illinois

SHARE XIV Meeting
Date: February 15-19, 1960
Place: Statler Hilton Hotel, Los Angeles, California

IRE National Convention
Date: March 21-24, 1960
Place: Coliseum and Waldorf Astoria Hotel, New York, New York

Western Joint Computer Conference
Date: May 2-6, 1960
Place: San Francisco, California

Conference on Automatic Computing and Data Processing in Australia, sponsored by the Australian National Committee on Computation and Automatic Control
Date: May 24-27, 1960
Place: University of Sydney and University of New South Wales
Information: C. H. D. Harper, Secretary, Australian National Committee on Computation and Automatic Control, c/o The Institution of Engineers, Science House, 157 Gloucester Street, Sydney, Australia

National ACM Conference
Date: August 23-25, 1960
Place: Marquette University, Milwaukee, Wisconsin

# References

The publishers of books and periodicals mentioned in this issue of DATA PROCESSING DIGEST are listed below for your convenience in writing to them for more complete information.

The Accountant
4 Drapers' Gardens
Throgmorton Avenue
London EC 2, England

Automatic Data Processing
Mercury House
109-119 Waterloo Rd.
London SE 1, England

Best's Life News
75 Fulton Street
New York 38, New York

The Computer Journal
Finsbury Court
Finsbury Pavement
London EC 2, England

Data Processing
Dorset House
Stamford Street
London SE 1, England

Internal Auditor
120 Wall Street
New York 5, New York

ISA Journal
313 Sixth Avenue
Pittsburgh 22, Pennsylvania

Journal of Institution of Electrical Engineers
Savoy Place
London WC 2, England

Journal of Machine Accounting
208 South Main Street
Paris, Illinois

NABAC, The Association for Bank Audit, Control and Operation
38 South Dearborn Street
Chicago 3, Illinois

Navy Management Review
Supt. of Documents
U.S. Government Printing Office
Washington 25, D. C.

The Office
232 Madison Avenue
New York 16, New York

Office Equipment & Methods
University Avenue
Toronto, Canada

Office Management
212 Fifth Avenue
New York 10, New York

Purchasing
205 East 42nd Street
New York 17, New York

PS: Paperwork Simplification
The Standard Register Co.
Dayton 1, Ohio

Systems and Procedures
4463 Penobscot Building
Detroit 26, Michigan

United States Investor
286 Congress Street
Boston 10, Mass.

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